

FAIRCHILD
SPACE AND DEFENSE SYSTEMS

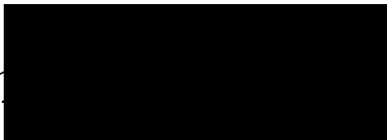
FAIRCHILD

SPACE AND DEFENSE SYSTEMS

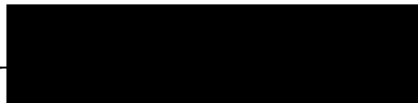
ACCEPTANCE TEST SPECIFICATION
AND PROCEDURE
FOR THE
CHIP FORMAT PRINTER

STATINTL

Prepared by:



Approved by:



Program Director

STATINTL

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 1

1. SCOPE AND EFFECTIVITY

1.1 Scope

This specification outlines the Acceptance Test Procedure for the Chip Format Printer (CFP).

2. APPLICABLE DOCUMENTS

2.1 Specifications

2.1.1 Specification of a Chip Format Printer
7 July 1965

2.1.2 Amendment I - Specification of a Chip Format, 15 October 1965.

2.1.3 List of Modifications to Item 2.1.2.

2.2 Drawings

2.2.1 FSDS Drawing No. 1137A1 CFP Assembly

2.2.2 FSDS Drawing No. 1137SD-1 thru SD-14 - CFP Schematic

2.2.3 FSDS Specification Control Drawing No. 1137 Inst. 1
(outline and installation)

2.3 Record Data Sheets

Data Sheets for Test Spec Title and Number

Sheet No. 1 - Electrical mechanical visual inspection

Sheet No. 2 - Performance specification

Sheet No. 3 - Positional accuracy

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 2

2.3 (continued)

Sheet No. 4 - Automatic Chip Counter & Character Generator

Sheet No. 5 - Parity Error

Sheet No. 6 - Automatic Exposure Control

Sheet No. 7 - Resolution

3. TEST EQUIPMENT

3.1 Peculiar Equipment

3.1.1 Target Films

3.1.2 Target Tapes

3.1.3 Resolution Targets

3.2 Commercial Equipment

3.2.1 Densitometer

3.2.2 Sensitometer

3.2.3 Microscope

3.2.4 Development Equipment

4. EXPLANATORY INFORMATION

4.1 Failure Provisions

In case the unit under test fails to meet a requirement of this specification, it should be noted in the data sheet of the unit under test.

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 3

4.2 Data Recording and Log Book

Data sheets shall be prepared completely for each unit under test. Actual test values shall be recorded of the unit under test even in the event of failure. A daily log book shall be kept with details of each days testing. This log book shall be delivered with the unit.

4.3 Retesting

In case of failure of the unit under test, the unit shall be retested to the requirements of paragraph 5.2, Performance Requirements, after necessary adjustment and repair.

4.4 Test Equipment Substitutions

It is permissible to substitute for any test equipment called out in Paragraph 3 provided that the substituted equipment is capable of performing the particular test or tests without modifying the results.

5. REQUIREMENTS

5.1 Mechanical Requirements

Prior to determining compliance with the performance requirements, the following mechanical requirements shall be met.

5.1.1 Dimensions

The unit shall be checked to determine compliance with the dimensions called out in FSDS Installation Drawing No. 1137 - Inst. 1.

5.1.2 Markings

Appropriate nameplates shall be placed on all three major assemblies.

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 4

5.1.3 Workmanship

The unit shall be examined visually for workmanship as evidenced by the neatness and thoroughness of marking of parts, plating, riveting, machine screw assemblage, soldering and wiring in accordance with FSDS accepted standards.

5.2 Performance Requirements

5.2.1 Initial Set Up

The Chip Format Printer (CFP) will be installed as per FSDS drawing 1137-Inst. 1. All reservoirs and magazines will be empty and the ON-OFF switch on the vacuum pump will be OFF. The external air source will be cut off. The 80 mm mask will be in place and the Print Magazine will be in the 80 mm position. All indicator lights should be extinguished. If not, the MAIN POWER switch should be depressed. This will extinguish all lights.

5.2.2 Main Power

Actuate MAIN POWER switch. The MAIN POWER should light. All other indicators and switches should remain extinguished for approximately 10 seconds. After 10 seconds the STBY of the STBY/ON switch should light. The following switches should be illuminated:

MAIN POWER
STBY of STBY/ON
80 mm MAG POS
80 mm MASK SIZE

} UPPER LEFT CONTROL PANEL

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 5

0 of EXPOSURE CONTROL AUTO of PRINTS REQD AUTO of AEC VIEW NO GO of GO/NO GO	}	LOWER LEFT CONTROL PANEL
---	---	-----------------------------

END OF FILM UPPER RIGHT CONTROL PANEL

MAN OF X-Y-AZ LOWER RIGHT CONTROL PANEL

Either half of the following manually operated split screen indicators or switches may be illuminated:

MANUAL - FAST/SLOW MANUAL SELECT - X-Y-AZ FILM DRIVE CHANNEL - UPPER/LOWER AZ POSITION - ZERO/LOAD	}	LOWER LEFT CONTROL PANEL
---	---	--------------------------------

The following malfunction indicators or switches should be illuminated:

CHIP CASS EMPTY DATA MAST EMPTY AIR LIQUID EMPTY VAC of AIR/VAC	}	UPPER LEFT CONTROL PANEL
---	---	--------------------------

The following indicators should be extinguished:

VENT UPPER LEFT CONTROL PANEL

5.2.3 Malfunction Check

- 5.2.3.1 Chip Cass Empty - Remove and load the chip cassette with a minimum of 25 chips (the CHIP CASS EMPTY indicator will light when there are from 0-25 chips, depending on chip thickness, left in the cassette).

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 6

- 5.2.3.2 Data Master Empty - Install a roll of Cronapress in the Cronapress carriage. The DATA MAST EMPTY indicator should be extinguished.
- 5.2.3.3 Air - Connect the air hose with a minimum of 50 psi to the CFP air connection. The AIR indicator should extinguish.
- 5.2.3.4 Liquid Empty - Fill the Gate Liquid Dispensing Tank with gate liquid. The LIQUID EMPTY indicator should extinguish when there is more than 0.5 liter of liquid in the tank. Fill with approximately 20 liters.
- 5.2.3.5 Vacuum - Turn the ON-OFF switch on the vacuum pump (mounted in the rear of the Electronic Cabinet) to the ON position. The VAC indicator should extinguish after a short period.
- 5.2.3.6 Magazine Position and Mask Size - The 80 mm position of the MASK SIZE and MAG POS indicator should be illuminated green. Move the Print Magazine to the 55 mm position. The 55 portion of the MAG POS indicator and the 80 position of the MASK SIZE should illuminate red. Push the Print Magazine to the rearmost position and remove the 80 mm mask and install the 55 mm mask. Move the Print Magazine to the 80 mm position. The 80 position of the MAG POS and the 55 position of the MASK SIZE should illuminate red. Move the Print magazine to the 55 mm position. The 55 portion of MASK SIZE and MAG position should be illuminated green.
- 5.2.4 Manual Controls
- 5.2.4.1 Azimuth - Actuate STBY-ON switch. Push the Print Magazine to the rearmost position. The ON half of the indicator should light, the STBY half extinguish. On the Lower Left Control Panel, place the MANUAL SELECT switch in AZ and the MANUAL switch in FAST by actuating the respective switch. Turn the AZIMUTH control CW and depress the OPERATION SWITCH. The Azimuth

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 7

Unit in the Print Console should move CW at a velocity proportional to the displacement of the AZIMUTH control. Actuate the MANUAL switch. The SLOW half of the indicator should light. The Azimuth Unit in the Print Console should continue to move at a reduced velocity, proportional to the Azimuth control displacement.

- 5.2.4.2 Azimuth Position - Rotate the azimuth unit CCW until the AZ POSITION-ZERO indicator lights. The azimuth unit is now in the zero position. Rotate Azimuth CW approximately 270°. The AZ POSITION-ZERO light shall go out and the LOAD light shall come on. The supply film spool should be visible at the front of the Print Console. Rotate Azimuth CCW 180°. The LOAD light should extinguish and come on again when the take-up spool is at the front of the Print Console. Continue rotating Azimuth CCW. The Azimuth Unit shall have traversed a minimum of 360° by the time it hits the CCW STOP. Rotate Azimuth CW unit until the ZERO lights.
- 5.2.4.3 Y Operation - Load a roll of 70 mm film on the upper film drive and a roll of 5-inch film on the lower film drive. Both films shall have at least one splice to show splice handling capability. Return the Azimuth to the Zero position. Press the MANUAL SELECT switch to X-Y position. Set the MANUAL speed to FAST. Depress the OPERATION SWITCH and simultaneously move the JOYSTICK forward. The Y carriage and the films shall move in the forward direction at a speed proportional to the throw of the Joystick. Return the JOYSTICK to the Center Position. The Y carriage shall stop. Move the JOYSTICK backward, the Y carriage shall move backward and stop when the JOYSTICK is returned to the center position. Repeat the above with the MANUAL speed set to SLOW. The same results shall apply, except that the speed shall be slower.
- 5.2.4.4 X Operation - Press the Film Channel Drive to UPPER position, and MANUAL speed to FAST. Depress the OPERATION SWITCH and simultaneously move the JOYSTICK to the right. The upper film drive shall spool the 70 mm film to the right in proportion to

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 8

the throw of the Joystick. Continue running the film to the right until the UPPER END OF FILM INDICATOR \longrightarrow lights.

Move the JOYSTICK to the left. The END OF FILM \longrightarrow should go out and the film shall travel to the left. Continue running the film to the left until the UPPER END OF FILM \longleftarrow indicator lights. Move the Joystick to the right until the END OF FILM \longleftarrow goes out. Press the MANUAL speed to SLOW. Repeat the above. The same results shall apply except that the speed will be slower. It is unnecessary to drive the film to the end of film limits.

5.2.4.5 Depress the FILM CHANNEL DRIVE to LOWER. Repeat the previous tests of 5.2.4.4 and the same results shall apply to the 5-inch film on the Lower drive, including the end of film limits.

5.2.4.6 Film Footage Counter - Load a roll of film on the Lower film drive with premeasured 15 ft. and 50 ft. calibration. Set the FILM CHANNEL DRIVE to LOWER and reset the LOWER TRACK FILM FOOTAGE COUNTER to Zero. Drive the X Channel until the 15 ft. calibration marker is reached. The LOWER TRACK FILM FOOTAGE COUNTER shall read 15 ft. \pm .2 ft. Continue driving the X in the same direction until the 50 ft. calibration is reached. The LOWER TRACK FILM FOOTAGE COUNTER shall indicate 50 ft. within the tolerance of \pm .2 ft.

Repeat the previous tests with calibrated film loaded on the upper drive. All readings shall now apply to the UPPER TRACK FILM FOOTAGE COUNTER.

5.3 Functional Tests

5.3.1 Positioning Accuracy

Load a roll of 9-inch film with the appropriate premeasured cross lines scribed on it. Position the film so that the reference cross

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 9

lines or film fiducials line up with the fiducial markers on the 80 mm mask. Load a punch tape on the tape reader having the X, Y and Azimuth information corresponding to the particular set of cross hairs to be checked. Set the following switches thusly:

FILM CHANNEL DRIVE - LOWER

X-Y-AZ - AUTO

Mensuration Counters X, Y and AZ - RESET ZERO

Press LOGIC RESET. Press TAPE READIN. The tape reader shall start operation. After the tape reader stops, the servos shall automatically start to position the film. When X has servoed and come to rest the SERVO COMPLETE indicator shall light. The unit should now be ready for making prints, i.e., the Chip Cassette shall be loaded with film, the Development Magazine shall be in place and Chip Holders shall be loaded. The Print Required counter should read 6. Before making prints, ensure that the liquid gate is not operating. Press the PRINT button. When all prints have been made, they shall be processed and then carefully measured. The distance from the center of the target cross lines to the center of the format as determined by the mask fiducials shall be measured. This distance shall be designated E_r .

$$E_r \text{ max} = \sqrt{E_x^2 \text{ max} + E_y^2 \text{ max}}$$

$$E_r \text{ max} = \sqrt{(.3 \text{ mm})^2 + (.2 \text{ mm})^2}$$

$$E_r \text{ max} = 0.36 \text{ mm}$$

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 10

Where $E_x \text{ max}$ and $E_y \text{ max}$ are the maximum X and Y errors respectively. The Azimuth error shall be measured between the target cross lines and the mask fiducials. The Azimuth error shall be 0.2 degree max.

5.3.2 Mensuration Counters

Load a roll of 9-inch film with the appropriate premeasured cross lines scribed on it. Position the film so that the reference cross lines or film fiducials line up with the fiducial markers on the 80 mm mask. ZERO RESET the MENSURATION COUNTERS (X, Y, & AZ). Now position the film manually in X, Y, and Azimuth so that the target crosslines coincide with the mask fiducials. The X MENSURATION COUNTER shall now read the premeasured X value ± 0.5 mm. The Y MENSURATION COUNTER shall now read the premeasured Y value ± 0.5 mm. The AZ MENSURATION COUNTER shall now read the premeasured Azimuth value ± 0.5 degrees.

5.3.3 AUTOMATIC CHIP COUNTER AND CHARACTER GENERATOR

A punch tape shall be prepared and installed on the tape reader containing the numerals 0 thru 9 and the letters A thru Z +, -, ., space, plus the additional machine readable symbols, Start of Message, End of Transmission, End of Address, DC4 Stop Code.

These characters will be arranged in sequence except for the section that contains the Print Quantity information. The Print Quantity shall call for 18 prints. Sufficient raw film and chip holders shall be loaded into the machine. The tape reader shall be started by depressing TAPE READIN button. After the tape readin is completed 18 shall appear on the PRINTS REQUIRED COUNTER. When SERVO COMPLETE lights, the print cycle shall be started by pressing the PRINT button. After exposing 18 chips the machine shall stop and the PRINTS PRINTED indicator shall read "18". The number of chips in the processing magazine shall be counted. There shall be

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 11

18 chips. Two chips shall be removed from the processing magazine for developing. After proper processing they shall be examined for legibility of the character generation. All alpha-numeric shall be present and readily legible. The machine readables shall be in a straight line array, both vertically and horizontally. The maximum deviation from a vertical line of any two bits in a vertical column shall be .005. The maximum deviation from a horizontal line of any two bits in a horizontal row shall be .005. Each bit shall have its edges clear and sharp with the contour varying from the mean edge line by no more than .010 inch max.

During the above, the Security classification shall also be printed on the output. Check for clarity.

5.3.4 Parity Error (Vertical)

Insert a punch tape that contains an intentional vertical parity error. Press LOGIC RESET and TAPE READIN. When the tape reader comes to the parity error, it shall stop and the PARITY ERROR - VERTICAL indicator shall light. The SERVO COMPLETE indicator shall not light neither shall the servos move.

(Longitudinal)

Insert a punch tape that contains an intentional longitudinal Parity error. Press LOGIC RESET and TAPE READIN. When the tape reader comes to the parity error, it shall stop and the PARITY ERROR - LONGITUDINAL indicator shall light. The SERVO COMPLETE indicator shall not light neither shall the servos move.

5.3.5 Automatic Exposure Control System

The Automatic Exposure System utilized in this printer consists of 3 separate parts.

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 12

- (a) The basic automatic system where the densities of the central area are sampled and integrated.
- (b) An auxiliary viewer and exposure control sensor where a 1/4 inch area in the center of the format is sampled, and the resultant light intensities then determine the relative exposure for that area.
- (c) Seven auxiliary buttons which may be used in conjunction with either system a or b above.

The seven buttons are set with the middle one on Normal (N) and each button on the right being (plus) (+) 1 stop from the next and each on the left being (minus) (-1) stop from the next or a total of 7 stops.

To check the above system input film shall be prepared consisting of 3 clear densities. It is not important what these densities are, providing they are known. An attempt should be made to cover a range equivalent to the average densities of expected inputs. Therefore, aim for the following densities:

- (a) .3
- (b) .9
- (c) 1.5

5.3.5.1 Normal View

Load the input film prepared above into the Chip Printer. Load a punch tape that contains positioning information of zero and prints required of 2. Manually position the film to the section of film desired to be reproduced. Reset mensuration counter. Press LOGIC RESET and TAPE READIN. When SERVO COMPLETE lights, press the Print Button. When printing stops, remove the 2 chips from the processing magazine for development and examination of print density. Repeat the above with all 3 densities.

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 13

The liquid gate shall be operating for all exposures.

5.3.5.2 Auxiliary Exposure Control

Repeat the above test utilizing the small screen viewer and exposure control. Both of these tests are to be done with the select buttons on Normal.

5.3.5.3 Repeat test 5.3.5.1 starting with the .9 density negative and the select buttons on Normal. Make an exposure for each select button throughout the full range of 7 stops.

Note in each of these tests 5.3.5.1, 5.3.5.2, and 5.3.5.3 all negatives are to be processed at the same time to insure consistent development.

5.3.6 Resolution

Note: Resolution target and pattern has been supplied by the customer.

Install a resolution target in the format area. The target shall be of high contrast and at least cover the range out to 400 line/mm. Set PRINTS REQUIRED to MAN and NO. PRINTS MAN dial to 2. Load the Chip Cassette with type 8430 film. Press the PRINT button. After processing the chips shall be examined. The resultant resolution shall be within a minimum of 12% or one target down from the manufacturer's rated resolution, which for this film 8430 developed in D-76 is 335 lines/mm.

Note: Because of the extremely small area being utilized by the resolution target it may be necessary to disengage the automatic exposure control to give a proper exposure. Resolution shall only be checked with proper exposure.

FAIRCHILD SPACE AND DEFENSE SYSTEMS

ENGINEERING SPECIFICATION

Sheet 14

5.3.7 Security Classification

In all of the preceding tests using punch tapes, a message was printed onto the output chip in the Security classification block. Each different test used a different message. Samples from each test shall be examined for legibility.

ELECTRICAL MECHANICAL VISUAL INSPECTION

Applicable
Par. of Spec.

Accepted Date
and Initiated

- | | | |
|-------|--|-------|
| 5.1.1 | 1. Dimensional check /per installation
Dwg. 1137-Inst-1 | _____ |
| 5.1.3 | 2. Name Plates | _____ |
| 5.1.5 | 3. Electrical Inspection | _____ |
| 5.1.5 | 4. Mechanical Inspection | _____ |

RECORD DATA SHEET No. 3POSITIONAL ACCURACY TESTS

Applicable
Par. of Spec.

5.3.1 1. Positional accuracy test

	<u>X pos.</u>	<u>Y pos.</u>	<u>Θ pos.</u>	<u>E_r</u>
Test Films No. 1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____

5.3.2 2. Mensuration Counters

	Counter Reading		
	<u>X pos.</u>	<u>Y pos.</u>	<u>O pos.</u>
Note: To be done in conjunction with Item 1, above.	_____	_____	_____
Test No. 1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____

NOTE: In the above tests each film to be individually marked so correlation can be accomplished after development.

AUTOMATIC CHIP COUNTER AND CHARACTER GENERATOR

Applicable
Par. of Spec.

5.3.3

1. Automatic Chip Counter and
Character Generator

a) Film selection read in number _____

number of films read in _____

b) Are all alpha numerics read in

complete and legible

Yes _____ No _____

REMARKS:

c) Are all digital displays complete

and legible

Yes _____ No _____

Each bit shall have its edge sharp

and clear with contour varying not

more than .010 max. from mean edge

d) Are all digital displays in a straight

line array both vertically and horiz-

ontally. Tolerance, column $\pm .005$

from main center line.

Dimension from
main center

e) Tolerance row $\pm .005$ from main

center line.

Dimension from
main center fine

PARITY ERROR

Applicable Para.
of Spec.

5.3.4

1. Parity Error:

a) Vertical parity error, O.K.

Yes _____ No _____

REMARKS:

b) Horizontal parity error, O.K.

Yes _____ No _____

c) Does Tape Reader STOP

Yes _____ No _____

RECORD DATA SHEET No. 6AUTOMATIC EXPOSURE CONTROL

Applicable
Par. of Spec.

5.3.5.1

1. Automatic Exposure Control
normal view

Output Density

Input (a) .3 density 1.
2.Input (b) .9 density 1.
2.Input (c) 1.5 density 1.
2.

Output density shall be approximately

.7 with normal development tolerance

 $\pm 1/2$ STOP

Evenness Variation

NOTE: Evenness of overall exposure
shall be within $\pm 20\%$

5.3.5.2

2. Auxiliary Exposure Control

Input (a) .3 density 1.
2.Input (b) .9 density 1.
2.Input (c) 1.5 density 1.
2.

Same tolerance as above.....

Evenness Variation

NOTE: Evenness of overall exposure
shall be within $\pm 20\%$.

RECORD DATA SHEET No. 6 (cont'd)Applicable
Para. of Spec.

Output

3. Exposure Select Buttons

Input .9 density + 3

+ 2

+ 1

Normal

- 1

- 2

- 3

Evenness Variation

DENSITIES SHALL INCREASE AND

DECREASE 1 STOP FOR EACH POSITION

LISTED AS OUTPUT FOR EACH STOP

POSITION AS LONG AS EXPOSURES ARE

ON THE STRAIGHT LINE PORTION OF THE

SENSITOMETRIC CURVE OF THE 8430 OUTPUT

FILM BEING UTILIZED....

RECORD DATA SHEET No. 7RESOLUTIONApplicable
Para. of Spec.

<u>Output Resolution</u>	
<u>Test Film</u>	<u>Test Film</u>
<u>1</u>	<u>2</u>

5.3.6 Test Film 1. Right Dia.
 Upper

1.		
----	--	--

2.		
----	--	--

Center

3.		
----	--	--

4.		
----	--	--

Right Dia.
Lower

5.		
----	--	--

6.		
----	--	--

Left Lower
Dia.

7.		
----	--	--

8.		
----	--	--

9.		
----	--	--

Left Upper
Dia.

10.		
-----	--	--

11.		
-----	--	--

12.		
-----	--	--

5.3.7 Security Classification

Check for clearness

All prints and correct
message...

Yes _____ No _____